

BEST AVAILABLE COPY

# EXHIBIT A



Docket No.: 050432-0593

**PATENT**

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re Application of	:	Customer Number: 20277
Lynne OKADA, et al.	:	Confirmation Number: 1080
Application No.: 10/728,774	:	Group Art Unit: 2823
Filed: December 08, 2003	:	Examiner: Estrada, Michelle
For: SEALING SIDEWALL PORES IN LOW-K DIELECTRICS		

**DECLARATION UNDER 37 CFR §1.131**

Mail Stop Declaration  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Sir:

We, Lynne A. Okada, Minh Quoc Tran, Fei Wang, and Lu You hereby declare that:

1. We are the inventors of the invention disclosed and claimed in the above-referenced United States patent application.
2. We are aware of the prosecution history of this application which was filed in the U.S. Patent and Trademark Office on December 8, 2003. We are also aware that claims in the application have been rejected under 35 U.S.C. §102 for lack of novelty and under 35 U.S.C. §103 for obviousness predicated primarily upon U.S. Patent 7,052,990 issued to Kim on May 30, 2006, based upon an application filed in the United States Patent and Trademark Office (USPTO) on September 3, 2003.

Application No.: 10/728,774

3. To our knowledge and in view of the factual evidence supplied herewith, the present invention was conceived in the United States prior to September 3, 2003, the filing date of the Kim patent application, as evidenced by the attached invention disclosure submitted to Advanced Micro Devices, Inc. (AMD), the assignee herein (Exhibit A hereto). The redacted dates are prior to September 3, 2003. Due diligence was exercised from prior to the September 3, 2003 filing date of the Kim patent application to the filing date of the present application on December 8, 2003.

4. We further declare that all statements made herein of our own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful statement may jeopardize the validity of the application or any patent issuing thereon.

10/9/06  
Date

Lynne A. Okada  
Lynne A. Okada

\_\_\_\_\_  
Date

\_\_\_\_\_  
Minh Quoc Tran

\_\_\_\_\_  
Date

\_\_\_\_\_  
Fei Wang

\_\_\_\_\_  
Date

\_\_\_\_\_  
Lu You

**AMD INVENTION DISCLOSURE**

TLD ID#

H1094

Rec'd date

California &amp; Asia: x42110, return to MS68;

Texas: x55964 return to MS562;

Dresden &amp; Europe: x83401 Silke Kretzschmar at MS E21-PP.

This invention applies to: Project: ☐, Product: ☐, Process: ☒, Technology ☒, Other ☐,  
**IMPORTANT** Please identify any potential use: improved sidewall profile for better BMD coverage

List 2 to 5 key search words related to the invention: Photoresist shrinking techniques for sidewall sealing

Working title of invention: Using ~~PR~~ shrinking techniques to seal sidewall pores

Inventor's signature: Lynne A. Okada date: \_\_\_\_\_  
Inventor's printed full name: Lynne A. Okada Citizenship: USA  
Employee #: 24970 Extension: 44686 Mail stop: 160 Home telephone: (408) 714 732-8052  
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Division: TDG Directorate: APD Dept #: 7196 Dept: APD/IDP Manager: Mark Chang  
Residence address: 1031 Grape Ave, Sunnyvale, CA 94087  
Post Office address: \_\_\_\_\_

Co-Inventor's signature: Minh Tran date: \_\_\_\_\_  
Co-Inventor's printed full name: Minh Quoc Tran Citizenship: U.S.A  
Employee #: 24375 Extension: 43104 Mail stop: 79 Home telephone: (408) 719-8050  
AMD email address: minh.tran@amd.com AMD office FAX: (408) 749-3851  
Division: TDG Directorate: APD Dept #: 7198 Dept: APD/IDP Manager: Richard Huang  
Residence address: 1722 Mirabella Ct, Milpitas, CA 95035  
Post Office address: \_\_\_\_\_

Co-Inventor's signature: Fei Wang date: \_\_\_\_\_  
Co-Inventor's printed full name: Fei Wang Citizenship: USA  
Employee #: 63099 Extension: 42437 Mail stop: 79 Home telephone: (408) 725-0658  
AMD email address: Fei.Wang@AMD.com AMD office FAX: (408) 749-3851  
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Residence address: 6005 Westlark way, San Jose, Ca 95129  
Post Office address: \_\_\_\_\_

Co-Inventor's signature: Lu Yu date: \_\_\_\_\_  
Co-Inventor's printed full name: Lu Yu Citizenship: China  
Employee #: 23537 Extension: 46584 Mail stop: 162 Home telephone: (408) 366-1808  
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Division: \_\_\_\_\_ Directorate: \_\_\_\_\_ Dept #: \_\_\_\_\_ Dept: \_\_\_\_\_ Manager: \_\_\_\_\_  
Residence address: lu.yu@amd.com  
Post Office address: \_\_\_\_\_

State total number of inventors here: 4. If there are more than four inventors, insert duplicate page 1.

Witness 1 initial: BWWitness 2 initial: JX



**AMD INVENTION DISCLOSURE**

TLD ID# \_\_\_\_\_

Rec'd date \_\_\_\_\_

California &amp; Asia: x42110, return to MS68;

Texas: x55964 return to MS562;

Dresden &amp; Europe: x83401 Silke Kretzschmar at MS E21-PP.

Advantages (check all that apply):

<input type="checkbox"/> simplifies manufacturing	<input checked="" type="checkbox"/> improves accuracy / precision	<input type="checkbox"/> reduces component parts
<input type="checkbox"/> reduces cost of manufacturing	<input checked="" type="checkbox"/> improves reliability	<input type="checkbox"/> improves signal to noise ratio
<input checked="" type="checkbox"/> improves density	<input type="checkbox"/> improves efficiency	<input type="checkbox"/> provides new functionality
<input checked="" type="checkbox"/> increases operating speed	<input type="checkbox"/> increases operating range	<input type="checkbox"/> other, explain below

Discussion of advantage(s) of the invention over other solutions

(emphasize technical advance in the art as measured against known art): \_\_\_\_\_

Current techniques for sidewall sealing utilize inorganic material such as SiN, SiC, or SiCN. These materials have relatively high dielectric constants (~7, ~4, and ~3.5). Utilizing a material that causes small surface distortions (to close the sidewall porosity) would cause the least impact to the CD.

Please take special care to preserve documentary evidence of the original date of conception of the invention. AMD Inventors' notebooks with witness signatures are useful in this regard. Notebooks are issued on request to inventors by the local AMD site Technical Librarian.

Please attach copy of first written description(s) of invention, with dates, names of persons with whom the description was discussed.

Please attach copy of first drawing(s) of invention, with date(s).

Describe any external disclosure of invention, place, date, circumstances of disclosure, with copy of NDA.

Does plan exist to publish, disclose or sell? No ☐, Yes ☐, If yes, where and when? \_\_\_\_\_

Was invention jointly developed with participation of inventors from outside AMD: No ☐, Yes ☐,  
If yes, Company name \_\_\_\_\_

If yes, name of AMD business contact and development contract no. \_\_\_\_\_

**I have read and understood this disclosure and read and signed each page of the attachments:**

Witness 1

signature: \_\_\_\_\_

Date: \_\_\_\_\_

Printed name: \_\_\_\_\_

Betty Wilkins

Employee #: 24865

Witness 2

signature: \_\_\_\_\_

Date: \_\_\_\_\_

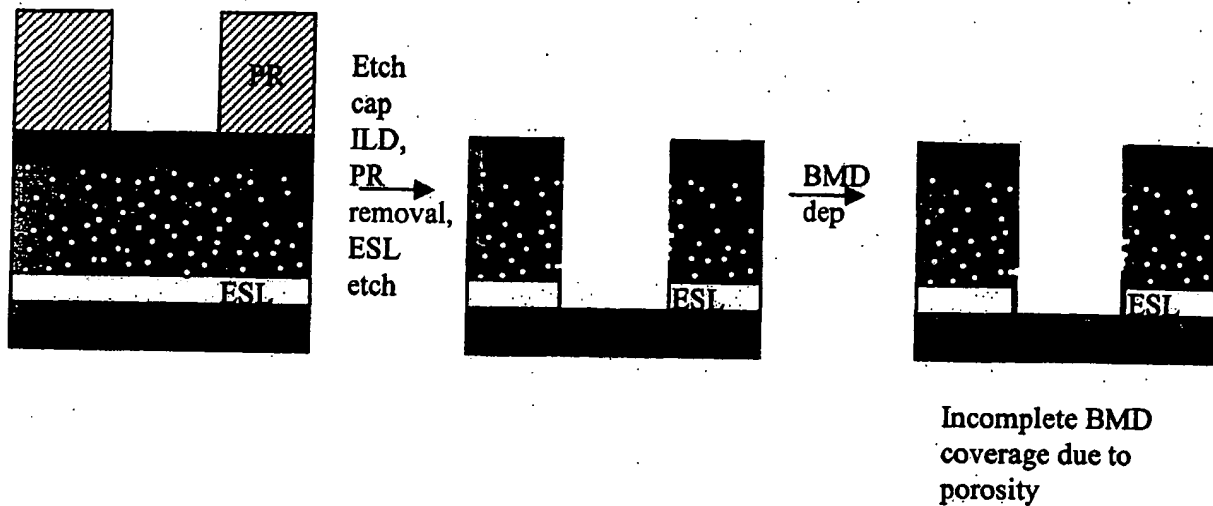
Printed name: \_\_\_\_\_

James Xie

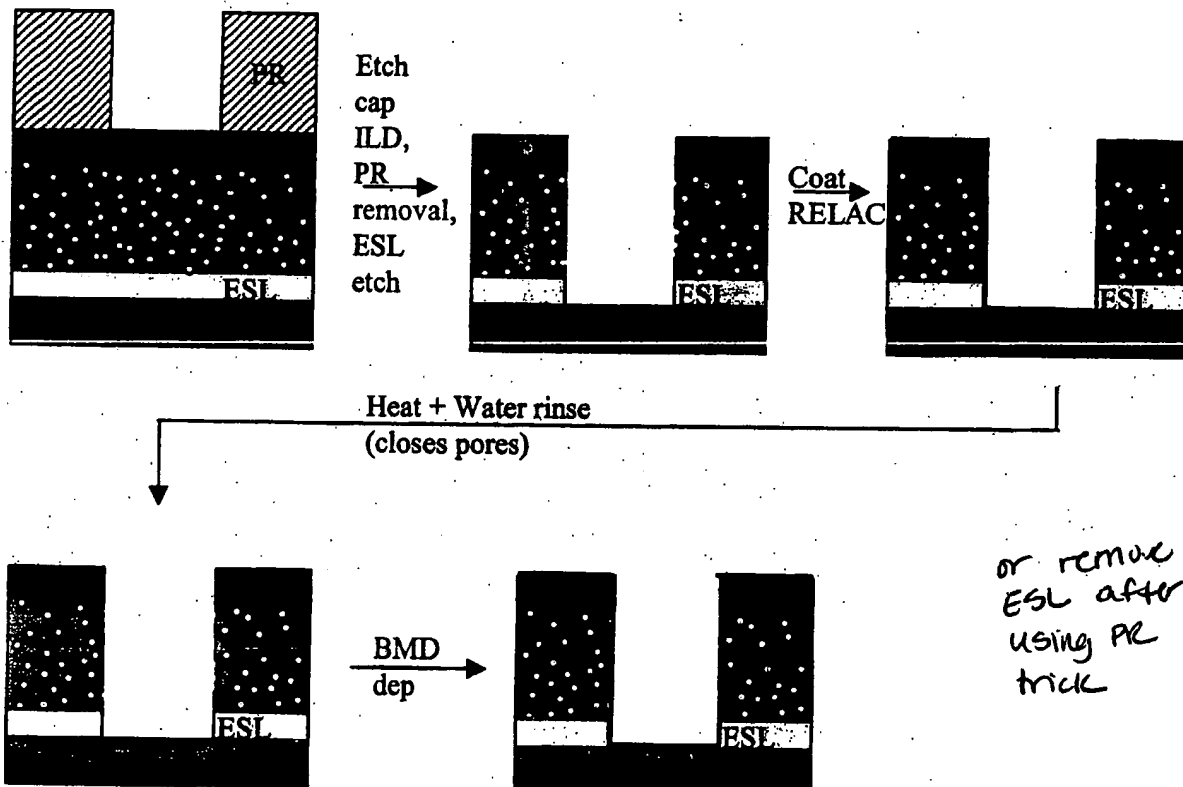
Employee #: 26375

Name(s) of attorney(s) preferred by inventor(s) to prepare patent application, if known: John Hankins at McDermott, Will and Emery \_\_\_\_\_

## Background



## PR tricks



or remove  
ESL after  
using PR  
trick

Witness 1 BW

Witness 2 JX

AMD Confidential  
L. Okada

**AMD INVENTION DISCLOSURE**

TLD ID#

71095

Rec'd date

California &amp; Asia: x42110, return to MS68;

Texas: x55964 return to MS562;

Dresden &amp; Europe: x83401 Silke Kretzschmar at MS E2 1-PP.

This invention applies to: Project: ☐, Product: ☐, Process: ☒, Technology ☒, Other ☐.

**IMPORTANT** Please identify any potential use: improved sidewall profile for better BMD coverage

List 2 to 5 key search words related to the invention: sidewall sealing using adhesion promoter

71402 secspin on materialsWorking title of invention: Use of Dow Chemical's Adhesion Promoter to seal sidewall pores

Inventor's signature: Lynne A. Okada date: \_\_\_\_\_  
Inventor's printed full name: Lynne A. Okada Citizenship: USA  
Employee #: 24970 Extension: 44686 Mail stop: 160 Home telephone: (408) 732-8032  
AMD email address: lynne.okada@amd.com AMD office FAX: (408) 749-5144  
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Post Office address: \_\_\_\_\_

Co-Inventor's signature: Fei Wang date: \_\_\_\_\_  
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Post Office address: \_\_\_\_\_

Co-Inventor's signature: Li You date: \_\_\_\_\_  
Co-Inventor's printed full name: Li You Citizenship: China  
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AMD email address: li.you@amd.com AMD office FAX: ( )  
Division: TDG Directorate: TRG Dept #: 7199 Dept: \_\_\_\_\_ Manager: R. Huang  
Residence address: 5978 Friar Way, San Jose, CA 95129  
Post Office address: \_\_\_\_\_

Co-Inventor's signature: Minh Tran date: \_\_\_\_\_  
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Employee #: 24378 Extension: 43104 Mail stop: 79 Home telephone: (408) 719 3050  
AMD email address: minh.tran@amd.com AMD office FAX: (408) 749-3851  
Division: TDG Directorate: APD Dept #: 7198 Dept: APD/PS Manager: Richard Huang  
Residence address: 1722 Mirabelle Ct., Milpitas, CA 95035  
Post Office address: \_\_\_\_\_

State total number of inventors here: 4. If there are more than four inventors, insert duplicate page 1.Witness 1 initial: BW Witness 2 initial: JX





**AMD INVENTION DISCLOSURE**

TLD ID# \_\_\_\_\_

Rec'd date \_\_\_\_\_

California &amp; Asia: x42110, return to MS68;

Texas: x55964 return to MS562;

Dresden &amp; Europe: x83401 Silke Kretzschmar at MS E21-PP.

Advantages (check all that apply):

<input type="checkbox"/> simplifies manufacturing	<input checked="" type="checkbox"/> improves accuracy / precision	<input type="checkbox"/> reduces component parts
<input type="checkbox"/> reduces cost of manufacturing	<input checked="" type="checkbox"/> improves reliability	<input type="checkbox"/> improves signal to noise ratio
<input checked="" type="checkbox"/> improves density	<input type="checkbox"/> improves efficiency	<input type="checkbox"/> provides new functionality
<input checked="" type="checkbox"/> increases operating speed	<input type="checkbox"/> increases operating range	<input type="checkbox"/> other, explain below

Discussion of advantage(s) of the invention over other solutions

(emphasize *technical advance in the art* as measured against known art): \_\_\_\_\_

Current techniques for sidewall sealing utilize inorganic material such as SiN, SiC, or SiCN. These materials have relatively high dielectric constants (~7, ~4, and ~3.5). Utilizing Dow Chemical's adhesion promoter would effectively seal the sidewall porosity without using a high dielectric constant material. Additionally, the adhesion promoter is designed to coat a very thin surface films. \_\_\_\_\_

Please take special care to preserve documentary evidence of the original date of conception of the invention. AMD Inventors' notebooks with witness signatures are useful in this regard. Notebooks are issued on request to inventors by the local AMD site Technical Librarian.

Please attach copy of first written description(s) of invention, with dates, names of persons with whom the description was discussed.

Please attach copy of first drawing(s) of invention, with date(s).

Describe any external disclosure of invention, place, date, circumstances of disclosure, with copy of NDA.

Does plan exist to publish, disclose or sell? No ☐, Yes ☐, If yes, where and when? \_\_\_\_\_

Was invention jointly developed with participation of inventors from outside AMD: No ☐, Yes ☐,

If yes, Company name \_\_\_\_\_,

If yes, name of AMD business contact and development contract no. \_\_\_\_\_

I have read and understood this disclosure and read and signed each page of the attachments:

Witness 1

signature: \_\_\_\_\_

Date: \_\_\_\_\_

Printed name: Betty WilliamsEmployee #: 24865

Witness 2

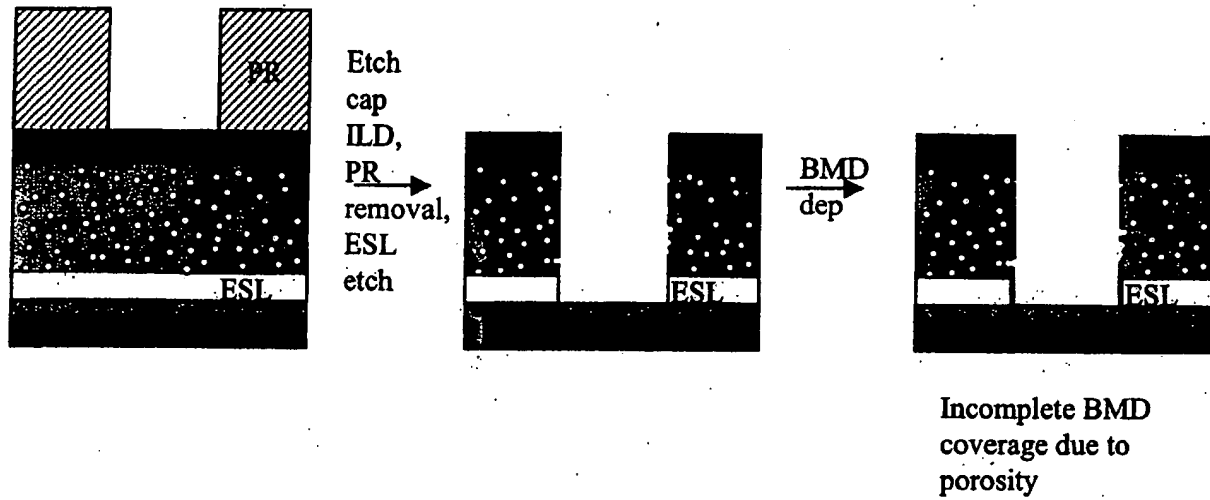
signature: \_\_\_\_\_

Date: \_\_\_\_\_

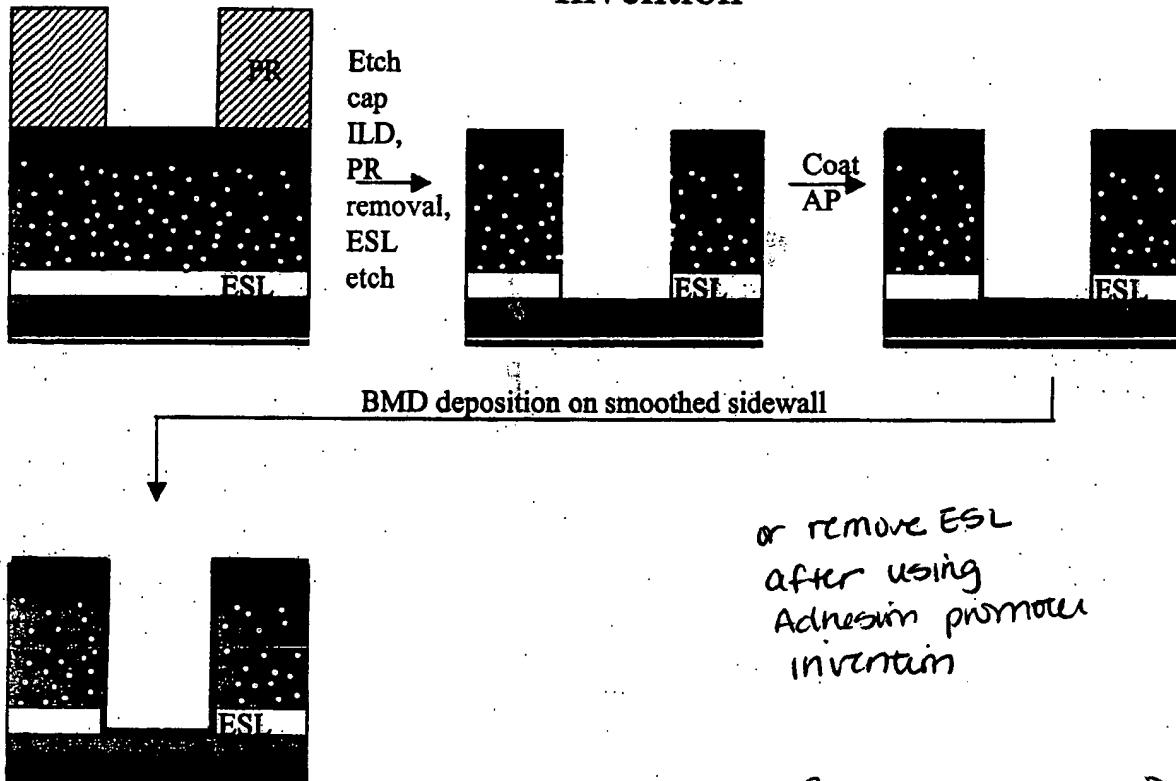
Printed name: JAMES XIEEmployee #: 26375

Name(s) of attorney(s) preferred by inventor(s) to prepare patent application, if known: John Hankins at McDermott, Will and Emery \_\_\_\_\_

## Background



## Adhesion Promoter Invention



Witness 1 BW

Witness 2 rt

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L. Okada

page 1

**AMD INVENTION DISCLOSURE**

TLD ID#

H1096

Rec'd date

California &amp; Asia: x42110, return to MS68;

Texas: x55964 return to MS562;

Dresden &amp; Europe: x83401 Silke Kretzschmar at MS E21-PP.

This invention applies to: Project: ☐, Product: ☐, Process: ☒, Technology ☒, Other ☐,  
**IMPORTANT** Please identify any potential use: improved sidewall profile for better BMD coverage

List 2 to 5 key search words related to the invention: sidewall sealing using mixed materials (hybrid)

Working title of invention: Using Mixed Materials for Sidewall Sealing

Inventor's signature: Lynne A. Okada date: \_\_\_\_\_  
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Post Office address: \_\_\_\_\_

Co-Inventor's signature: Fei Wang date: \_\_\_\_\_  
Co-Inventor's printed full name: Fei Wang Citizenship: USA  
Employee #: 63099 Extension: 42437 Mail stop: 79 Home telephone: (408) 725-0658  
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Division: TDG Directorate: TRG Dept #: 7881 Dept: TR Manager: Darrel Erb  
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Co-Inventor's signature: Minh Tran date: \_\_\_\_\_  
Co-Inventor's printed full name: Minh Quoc Tran Citizenship: U.S.A.  
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Division: TDG Directorate: APD Dept #: 7198 Dept: APD Manager: Richard Huang  
Residence address: 1722 Mirabella Ct, Milpitas, CA 95025  
Post Office address: \_\_\_\_\_

Co-Inventor's signature: Li You date: \_\_\_\_\_  
Co-Inventor's printed full name: Li You Citizenship: China  
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Division: TRG Directorate: APD Dept #: 7199 Dept: TRG Manager: R. Haden  
Residence address: 5978 Friar Way, San Jose CA 95129  
Post Office address: \_\_\_\_\_

State total number of inventors here: 4. If there are more than four inventors, insert duplicate page 1.

Witness 1 initial: BWWitness 2 initial: JA

## AMD INVENTION DISCLOSURE

TLD ID#

Rec'd date

California & Asia: x42110, return to MS68;

Texas: x55964 return to MS562;

Dresden & Europe: x83401 Silke Kretzschmar at MS E21-PP.

**Identify known relevant art (patents, publications, other information):**

**State the problem solved by the invention:**

## Smoothing out the sidewall pores in porous ILD materials to improve BMD coverage

Brief description and sketch of the invention (*please attach copies of documents like AMD patent notebook pages, reports and drawings that are helpful in describing / understanding the invention*): \_\_\_\_\_

Use of a different low k material to seal sidewall pores and improve BMD coverage on the sidewalls. The materials for this invention include any hybrid porous/nonporous combinations and hybrid porous/porous combinations. For example, coating a JSR stack with porous or nonporous Black Diamond film. Other films currently available include Coral and SiLK. Both porous and nonporous coatings would cover the sidewall porosity and allow for better (continuous) BMD surface coverage.

**See drawing attachments.**

Patent notebook # \_\_\_\_\_ Page numbers \_\_\_\_\_ Number of drawings \_\_\_\_\_

Witness 1 initial: BW      Witness 2 initial: JA

sidewall sealing - hybrid combination Revised on 10/29/01.

**AMD** CONFIDENTIAL Attorney-Client Privileged Information

Page 2

**AMD INVENTION DISCLOSURE**

TLD ID# \_\_\_\_\_

Rec'd date \_\_\_\_\_

California &amp; Asia: x42110, return to MS68;

Texas: x55964 return to MS562;

Dresden &amp; Europe: x83401 Silke Kretzschmar at MS E21-PP.

Advantages (check all that apply):

<input type="checkbox"/> simplifies manufacturing	<input checked="" type="checkbox"/> improves accuracy / precision	<input type="checkbox"/> reduces component parts
<input type="checkbox"/> reduces cost of manufacturing	<input checked="" type="checkbox"/> improves reliability	<input type="checkbox"/> improves signal to noise ratio
<input checked="" type="checkbox"/> improves density	<input type="checkbox"/> improves efficiency	<input type="checkbox"/> provides new functionality
<input checked="" type="checkbox"/> increases operating speed	<input type="checkbox"/> increases operating range	<input type="checkbox"/> other, explain below

Discussion of advantage(s) of the invention over other solutions

(emphasize *technical advance in the art* as measured against known art): \_\_\_\_\_

Current techniques for sidewall sealing utilize inorganic material such as SiN, SiC, or SiCN. These materials have relatively high dielectric constants (~7, ~4, and ~3.5). Utilizing a hybrid approach allows use of a low k material to seal the sidewall porosity, leading to less influence on line capacitance. \_\_\_\_\_

**Please take special care to preserve documentary evidence of the original date of conception of the invention.**

AMD Inventors' notebooks with witness signatures are useful in this regard. Notebooks are issued on request to inventors by the local AMD site Technical Librarian.

Please attach copy of first written description(s) of invention, with dates, names of persons with whom the description was discussed.

Please attach copy of first drawing(s) of invention, with date(s).

Describe any external disclosure of invention, place, date, circumstances of disclosure, with copy of NDA.

Does plan exist to publish, disclose or sell? No ☐, Yes ☐, If yes, where and when? \_\_\_\_\_Was invention jointly developed with participation of inventors from outside AMD: No ☐, Yes ☐.

If yes, Company name \_\_\_\_\_

If yes, name of AMD business contact and development contract no. \_\_\_\_\_

**I have read and understood this disclosure and read and signed each page of the attachments:**

Witness 1

signature: \_\_\_\_\_

Date: \_\_\_\_\_

Printed name: \_\_\_\_\_

Betty Wilkins

Employee #: \_\_\_\_\_

24865

Witness 2

signature: \_\_\_\_\_

Date: \_\_\_\_\_

Printed name: \_\_\_\_\_

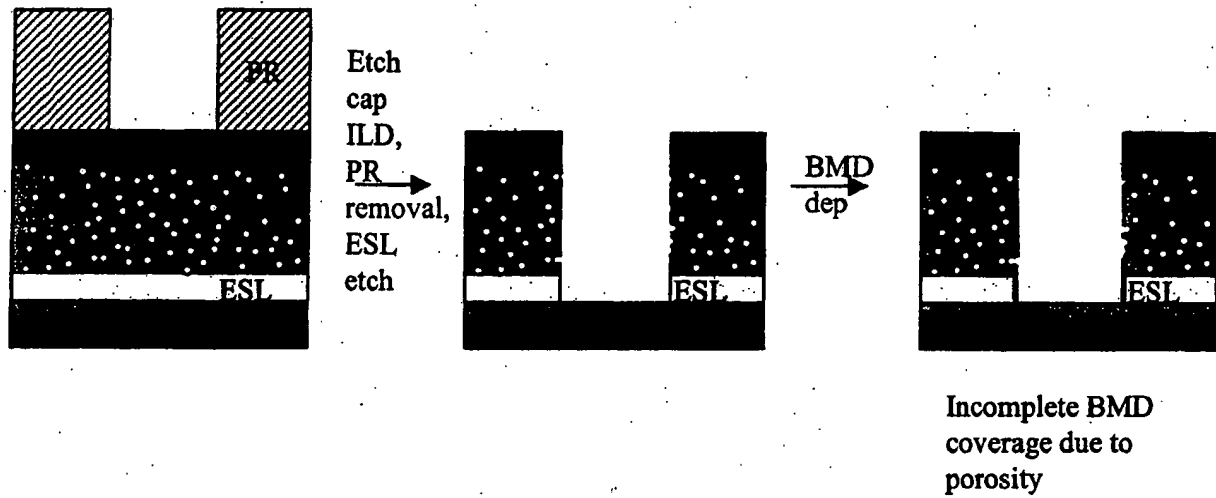
James XIE

Employee #: \_\_\_\_\_

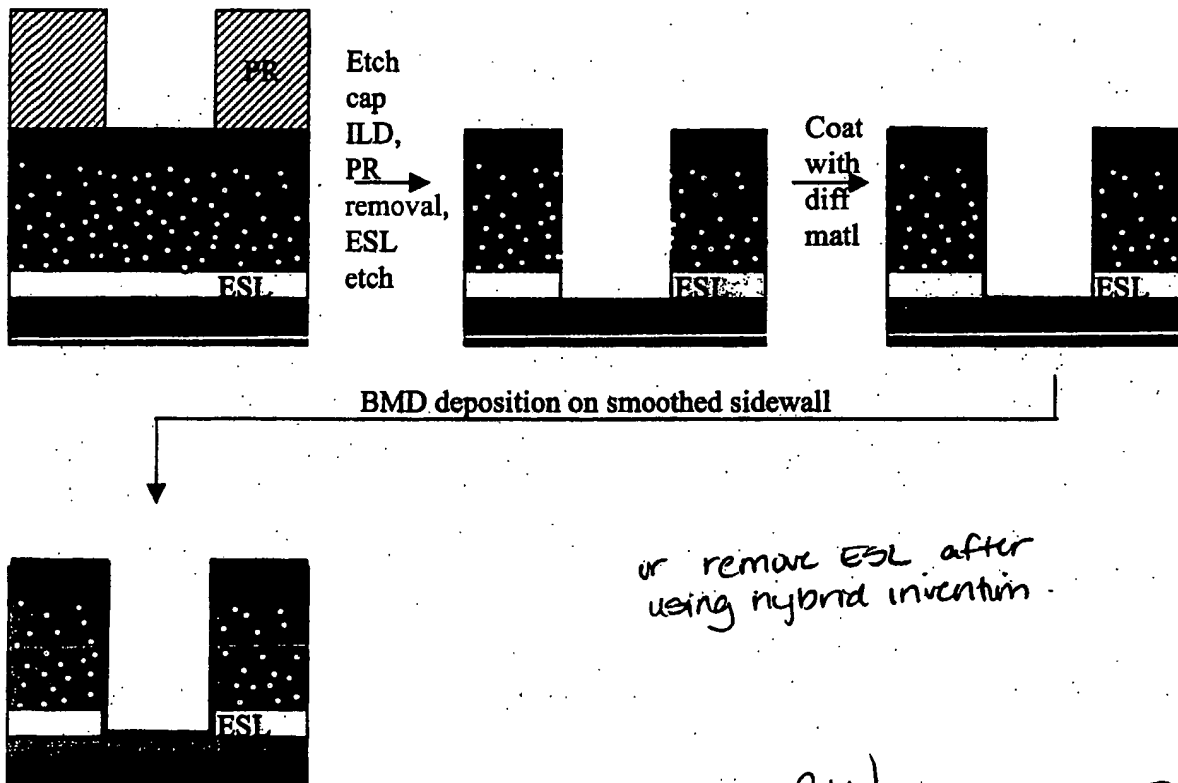
26375

Name(s) of attorney(s) preferred by inventor(s) to prepare patent application, if known: John Hankins at McDermott, Will and Emery \_\_\_\_\_

## Background



## Hybrid Invention



Witness 1

BW

Witness 2

Jk

**AMD INVENTION DISCLOSURE**

TLD ID#

H1097

Rec'd date

California &amp; Asia: x42110, return to MS68;

Texas: x55964 return to MS562;

Dresden &amp; Europe: x83401 Silke Kretzschmar at MS E21-PP.

This invention applies to: Project: ☐, Product: ☐, Process: ☒, Technology ☒, Other ☐.

**IMPORTANT** Please identify any potential use: improved sidewall profile for better BMD coverage

List 2 to 5 key search words related to the invention: self sealing sidewall

Working title of invention: Using "like" materials for sidewall sealing of porous ILDs

Inventor's signature: Lynne A. Okada date: \_\_\_\_\_  
Inventor's printed full name: Lynne A. Okada Citizenship: USA  
Employee #: 24970 Extension: 44686 Mail stop: 160 Home telephone: (408) 732-8052  
AMD email address: Lynne.Okada@amd.com AMD office FAX: (408) 749-5144  
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Witness 1 initial: BW Witness 2 initial: JX



**Rec'd date**

Dresden & Europe: x83401 Silke Kretzschmar at MS E21-PP

Page 2

**AMD INVENTION DISCLOSURE**

TLD ID# \_\_\_\_\_

Rec'd date \_\_\_\_\_

California &amp; Asia: x42110, return to MS68;

Texas: x55964 return to MS62;

Dresden &amp; Europe: x83401 Silke Kretzschmar at MS E21-PP.

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<input type="checkbox"/> simplifies manufacturing	<input checked="" type="checkbox"/> improves accuracy / precision	<input type="checkbox"/> reduces component parts
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Current techniques for sidewall sealing utilize inorganic material such as SiN, SiC, or SiCN. These materials have relatively high dielectric constants (~7, ~4, and ~3.5). Utilizing low k materials to seal sidewall pores would provide the benefit of sidewall sealing but not compromising the interlayer dielectric as much, minimizing the influence on the line capacitance. \_\_\_\_\_

**Please take special care to preserve documentary evidence of the original date of conception of the invention.**

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If yes, Company name \_\_\_\_\_

If yes, name of AMD business contact and development contract no. \_\_\_\_\_

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Witness 1

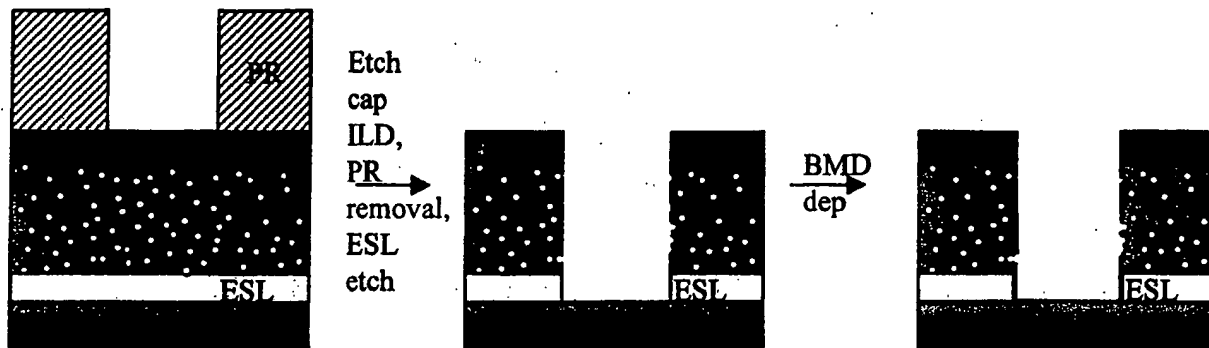
signature: Betty Wilens Date: \_\_\_\_\_ Employee #: 24865

Witness 2

signature: James Xie Date: \_\_\_\_\_ Employee #: 26375

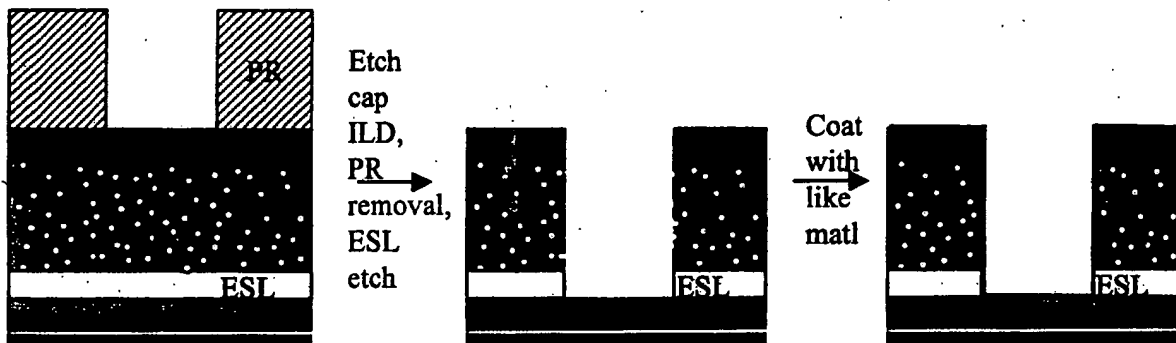
Name(s) of attorney(s) preferred by inventor(s) to prepare patent application, if known: John Hankins at McDermott, Will and Emery \_\_\_\_\_

## Background



Incomplete BMD coverage due to porosity

## Self-Sealing Invention



or remove ESL after using self-sealing invention

Witness 1 BW

Witness 2 JX

Docket No.: 050432-0593

**PATENT**

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re Application of	:	Customer Number: 20277
Lynne OKADA, et al.	:	Confirmation Number: 1080
Application No.: 10/728,774	:	Group Art Unit: 2823
Filed: December 08, 2003	:	Examiner: Estrada, Michelle
For: SEALING SIDEWALL PORES IN LOW-K DIELECTRICS	:	

**DECLARATION UNDER 37 CFR §1.131**

Mail Stop Declaration  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Sir:

We, Lynne A. Okada, Minh Quoc Tran, Fei Wang, and Lu You hereby declare that:

1. We are the inventors of the invention disclosed and claimed in the above-referenced United States patent application.
2. We are aware of the prosecution history of this application which was filed in the U.S. Patent and Trademark Office on December 8, 2003. We are also aware that claims in the application have been rejected under 35 U.S.C. §102 for lack of novelty and under 35 U.S.C. §103 for obviousness predicated primarily upon U.S. Patent 7,052,990 issued to Kim on May 30, 2006, based upon an application filed in the United States Patent and Trademark Office (USPTO) on September 3, 2003.

Application No.: 10/728,774

3. To our knowledge and in view of the factual evidence supplied herewith, the present invention was conceived in the United States prior to September 3, 2003, the filing date of the Kim patent application, as evidenced by the attached invention disclosure submitted to Advanced Micro Devices, Inc. (AMD), the assignee herein (Exhibit A hereto). The redacted dates are prior to September 3, 2003. Due diligence was exercised from prior to the September 3, 2003 filing date of the Kim patent application to the filing date of the present application on December 8, 2003.

4. We further declare that all statements made herein of our own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful statement may jeopardize the validity of the application or any patent issuing thereon.

Date

10/4/06

Date

10/9/06

Date

10/4/06

Date

Lynne A. Okada

Minh Tran

Minh Quoc Tran

Fei Wang

Lu You

**AMD INVENTION DISCLOSURE**

TLD ID#

H1094

Rec'd date

California &amp; Asia: x42110, return to MS68;

Texas: x55964 return to MS62;

Dresden &amp; Europe: x83401 Silke Kretzschmar at MS E21-PP.

This invention applies to: Project: ☐, Product: ☐, Process: ☒, Technology ☒, Other ☐  
**IMPORTANT** Please identify any potential use: improved sidewall profile for better BMD coverage

List 2 to 5 key search words related to the invention: Photoresist shrinking techniques for sidewall sealing

Working title of invention: Using ~~PR~~ shrinking techniques to seal sidewall pores

Inventor's signature: Lynne A. Okada date: \_\_\_\_\_  
Inventor's printed full name: Lynne A. Okada Citizenship: USA  
Employee #: 24970 Extension: 44686 Mail stop: 160 Home telephone: (408) 714-732-8052  
AMD email address: Lynne.Okada@amd.com AMD office FAX: (408) 749-5144  
Division: TDG Directorate: APD Dept #: 7196 Dept: APD Manager: Mark Chang  
Residence address: 1031 Grape Ave, Sunnyvale, CA 94087  
Post Office address: \_\_\_\_\_

Co-Inventor's signature: Minh Que Tran date: \_\_\_\_\_  
Co-Inventor's printed full name: Minh Que Tran Citizenship: U.S.A  
Employee #: 24375 Extension: 43104 Mail stop: 79 Home telephone: (408) 719-8052  
AMD email address: minh.tran@amd.com AMD office FAX: (408) 749-3851  
Division: TDG Directorate: APD Dept #: 7192 Dept: APD Manager: Richard Huang  
Residence address: 1722 Mirabella Ct, Milpitas, CA 95035  
Post Office address: \_\_\_\_\_

Co-Inventor's signature: Fei Wang date: \_\_\_\_\_  
Co-Inventor's printed full name: Fei Wang Citizenship: USA  
Employee #: 63099 Extension: 42437 Mail stop: 79 Home telephone: (408) 725-0658  
AMD email address: Fei.Wang@AMD.com AMD office FAX: (408) 749-3851  
Division: TRG Directorate: TDG Dept #: 7881 Dept: FR Manager: Darrel Erb  
Residence address: 6005 Wolfhart way, San Jose, Ca 95129  
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Co-Inventor's signature: Li Yu date: \_\_\_\_\_  
Co-Inventor's printed full name: Li Yu Citizenship: China  
Employee #: 23537 Extension: 46584 Mail stop: 160 Home telephone: (408) 366-1808  
AMD email address: 5978 Frick Way, San Jose AMD office FAX: ( )  
Division: \_\_\_\_\_ Directorate: \_\_\_\_\_ Dept #: \_\_\_\_\_ Dept: \_\_\_\_\_ Manager: \_\_\_\_\_  
Residence address: li.yu@amd.com  
Post Office address: \_\_\_\_\_

State total number of inventors here: 4. If there are more than four inventors, insert duplicate page 1.

Witness 1 initial: BWWitness 2 initial: JX

## AMD INVENTION DISCLOSURE

**TLD ID#****Rec'd date**

**California & Asia: x42110, return to MS68;**

**Texas: x55964** return to MS562;

Dresden & Europe: x83401 Silke Kretzschmar at MS E21-PP.

**Identify known relevant art (patents, publications, other information):**

**State the problem solved by the invention:**

### Smoothing out the sidewall pores in porous ILD materials to improve BMD coverage

**Brief description and sketch of the invention (please attach copies of documents like AMD patent notebook pages, reports and drawings that are helpful in describing / understanding the invention):** \_\_\_\_\_

Use of photoresist techniques to seal sidewall porosity to improve BMD surface coverage. One method would be swelling of the sidewall porosity to cause the surface pores to shrink(collapse). One example is Clariant's product, RELACS. The material sequence for processing would include patterning, coating with the RELACS material, heating (to induce the swelling) and rinsing (H<sub>2</sub>O). This would result in a smoother surface for improved BMD surface coverage.

**See drawing attachments.**

Patent notebook # \_\_\_\_\_ Page numbers \_\_\_\_\_ Number of drawings \_\_\_\_\_

**Witness 1 initial:**

Ba

**Witness 2 initial:**

✓x

**AMD INVENTION DISCLOSURE**

TLD ID# \_\_\_\_\_

Rec'd date \_\_\_\_\_

California &amp; Asia: x42110, return to MS68;

Texas: x55964 return to MS62;

Dresden &amp; Europe: x83401 Silke Kretzschmar at MS E21-PP.

Advantages (check all that apply):

<input type="checkbox"/> simplifies manufacturing	<input checked="" type="checkbox"/> improves accuracy / precision	<input type="checkbox"/> reduces component parts
<input type="checkbox"/> reduces cost of manufacturing	<input checked="" type="checkbox"/> improves reliability	<input type="checkbox"/> improves signal to noise ratio
<input checked="" type="checkbox"/> improves density	<input type="checkbox"/> improves efficiency	<input type="checkbox"/> provides new functionality
<input checked="" type="checkbox"/> increases operating speed	<input type="checkbox"/> increases operating range	<input type="checkbox"/> other, explain below

Discussion of advantage(s) of the invention over other solutions

(emphasize technical advance in the art as measured against known art): \_\_\_\_\_

Current techniques for sidewall sealing utilize inorganic material such as SiN, SiC, or SiCN. These materials have relatively high dielectric constants (~7, ~4, and ~3.5). Utilizing a material that causes small surface distortions (to close the sidewall porosity) would cause the least impact to the CD.

Please take special care to preserve documentary evidence of the original date of conception of the invention. AMD Inventors' notebooks with witness signatures are useful in this regard. Notebooks are issued on request to inventors by the local AMD site Technical Librarian.

Please attach copy of first written description(s) of invention, with dates, names of persons with whom the description was discussed.

Please attach copy of first drawing(s) of invention, with date(s).

Describe any external disclosure of invention, place, date, circumstances of disclosure, with copy of NDA.

Does plan exist to publish, disclose or sell? No ☐, Yes ☐, If yes, where and when? \_\_\_\_\_

Was invention jointly developed with participation of inventors from outside AMD: No ☐, Yes ☐,

If yes, Company name \_\_\_\_\_

If yes, name of AMD business contact and development contract no. \_\_\_\_\_

I have read and understood this disclosure and read and signed each page of the attachments:

Witness 1

signature: \_\_\_\_\_

Printed name: \_\_\_\_\_

Date: \_\_\_\_\_

Employee #: 24865

Witness 2

signature: \_\_\_\_\_

Printed name: \_\_\_\_\_

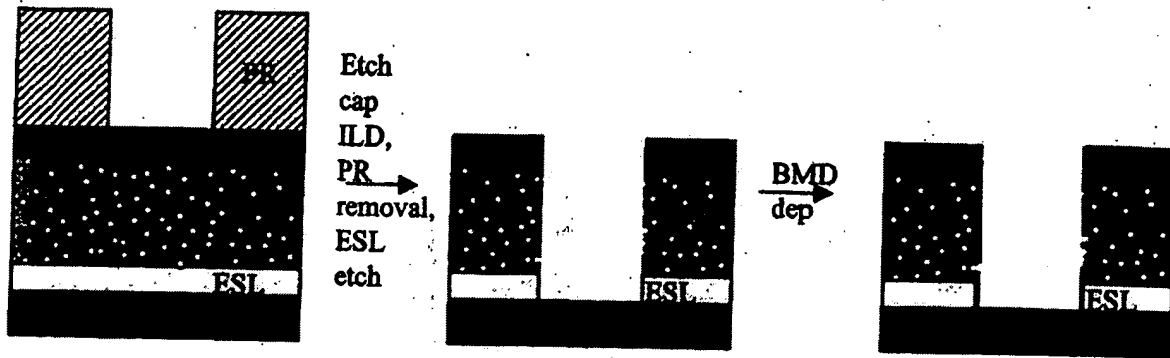
Date: \_\_\_\_\_

Employee #: 26375

Name(s) of attorney(s) preferred by inventor(s) to prepare patent application, if known: John Hankins at McDermott, Will and Emery \_\_\_\_\_

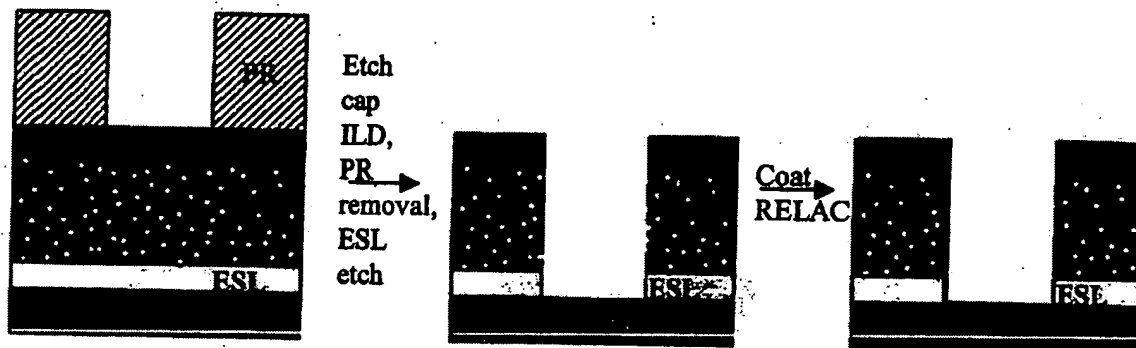


## Background

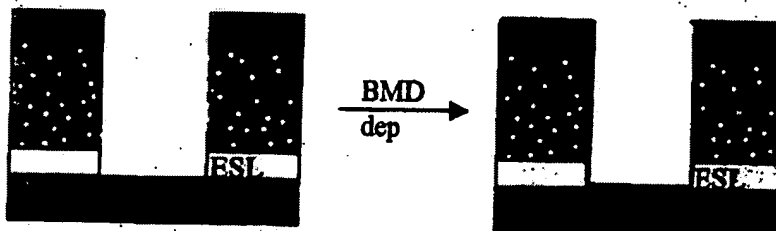


Incomplete BMD coverage due to porosity

## PR tricks



Heat + Water rinse  
(closes pores)



or remove  
ESL after  
using PR  
trick

Witness 1 BW

Witness 2 JX

AMD Confidential  
L. Okada

page 1

**AMD INVENTION DISCLOSURE**

TLD ID#

71095

Rec'd date

California & Asia: x42110, return to MS68;

Texas: x55964 return to MS562;

Dresden & Europe: x83401 Silke Kretzschmar at MS E2 I-PP.

This invention applies to: Project: ☐ Product: ☐ Process: ☒ Technology ☒ Other ☐  
**IMPORTANT** Please identify any potential use: improved sidewall profile for better BMD coverage

List 2 to 5 key search words related to the invention: sidewall sealing using adhesion promoter

Working title of invention: Use of ~~Dow Chemical's~~ spin materials Adhesion Promoter to seal sidewall pores

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Co-Inventor's signature: Fei Wang date: \_\_\_\_\_  
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Co-Inventor's signature: Y. Huang date: \_\_\_\_\_  
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Co-Inventor's signature: Minh Tran date: \_\_\_\_\_  
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Division: TDG Directorate: APD Dept #: 7198 Dept: APDIPB Manager: Richard Huang  
Residence address: 1722 Mirabelle Ct, Milpitas, CA 95035  
Post Office address: \_\_\_\_\_

State total number of inventors here: 4. If there are more than four inventors, insert duplicate page 1.

Witness 1 initial: BW Witness 2 initial: JX

## AMD INVENTION DISCLOSURE

**TLD ID#.**

**Rec'd date**

California & Asia: x42110, return to MS68;

**Texas: x55964 return to MS562;**

Dresden & Europe: x83401 Silke Kretzschmar at MS E21-pp.

**Identify known relevant art (patents, publications, other information):**

**State the problem solved by the invention:**

## Smoothing out the sidewall pores in porous ILD materials to improve BMD coverage

Brief description and sketch of the invention (please attach copies of documents like AMD patent notebook pages, reports and drawings that are helpful in describing / understanding the invention):

Use Dow Chemical's adhesion promoter to seal sidewall pores and improve BMD coverage on the sidewalls. For example, coating a porous SiLK patterned stack with adhesion promoter after patterning to seal the sidewall pores for better (continuous) BMD surface coverage.

**See drawing attachments.**

Patent notebook # \_\_\_\_\_ Page numbers \_\_\_\_\_ Number of drawings \_\_\_\_\_

Witness 1 initial: BW      Witness 2 initial: IX

sidewall seating - AP      Revised on 10/29/01.

**AMD** CONFIDENTIAL Attorney-Client Privileged Information

Page 2

**AMD INVENTION DISCLOSURE**

TLD ID# \_\_\_\_\_

Rec'd date \_\_\_\_\_

California &amp; Asia: x42110, return to MS68;

Texas: x55964 return to MS562;

Dresden &amp; Europe: x83401 Silke Kretschmar at MS E21-PP.

Advantages (check all that apply):

<input type="checkbox"/> simplifies manufacturing	<input checked="" type="checkbox"/> improves accuracy / precision	<input type="checkbox"/> reduces component parts
<input type="checkbox"/> reduces cost of manufacturing	<input checked="" type="checkbox"/> improves reliability	<input type="checkbox"/> improves signal to noise ratio
<input checked="" type="checkbox"/> improves density	<input type="checkbox"/> improves efficiency	<input type="checkbox"/> provides new functionality
<input checked="" type="checkbox"/> increases operating speed	<input type="checkbox"/> increases operating range	<input type="checkbox"/> other, explain below

Discussion of advantage(s) of the invention over other solutions

(emphasize technical advance in the art as measured against known art): \_\_\_\_\_

Current techniques for sidewall sealing utilize inorganic material such as SiN, SiC, or SiCN. These materials have relatively high dielectric constants (~7, ~4, and ~3.5). Utilizing Dow Chemical's adhesion promoter would effectively seal the sidewall porosity without using a high dielectric constant material. Additionally, the adhesion promoter is designed to coat a very thin surface films.

Please take special care to preserve documentary evidence of the original date of conception of the invention. AMD Inventors' notebooks with witness signatures are useful in this regard. Notebooks are issued on request to inventors by the local AMD site Technical Librarian.

Please attach copy of first written description(s) of invention, with dates, names of persons with whom the description was discussed.

Please attach copy of first drawing(s) of invention, with date(s).

Describe any external disclosure of invention, place, date, circumstances of disclosure, with copy of NDA.

Does plan exist to publish, disclose or sell? No ☐, Yes ☐, If yes, where and when? \_\_\_\_\_

Was invention jointly developed with participation of inventors from outside AMD: No ☐, Yes ☐,

If yes, Company name \_\_\_\_\_

If yes, name of AMD business contact and development contract no. \_\_\_\_\_

I have read and understood this disclosure and read and signed each page of the attachments:

Witness 1

signature: \_\_\_\_\_

Printed name: \_\_\_\_\_

Date: \_\_\_\_\_

Employee #: 24865

Witness 2

signature: \_\_\_\_\_

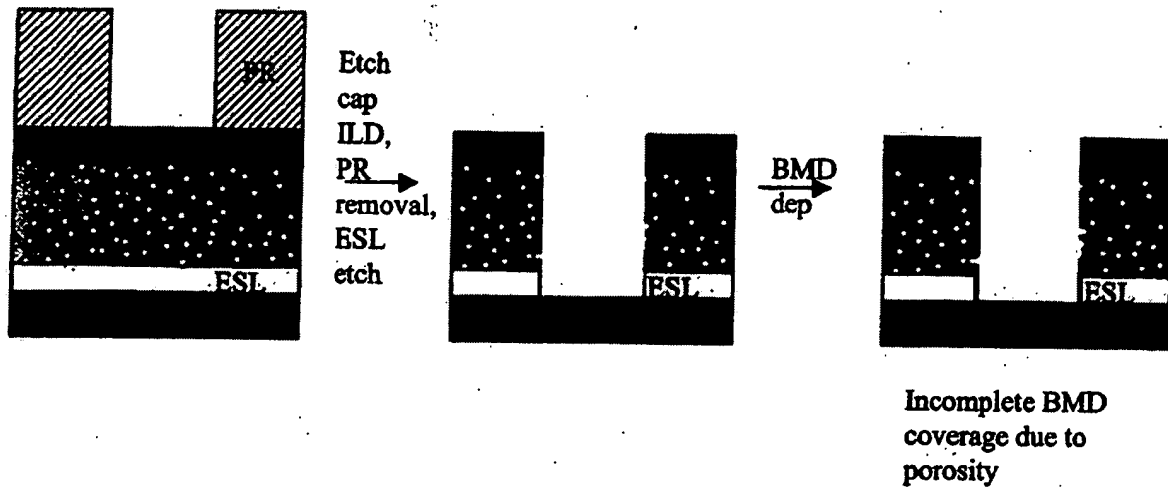
Printed name: \_\_\_\_\_

Date: \_\_\_\_\_

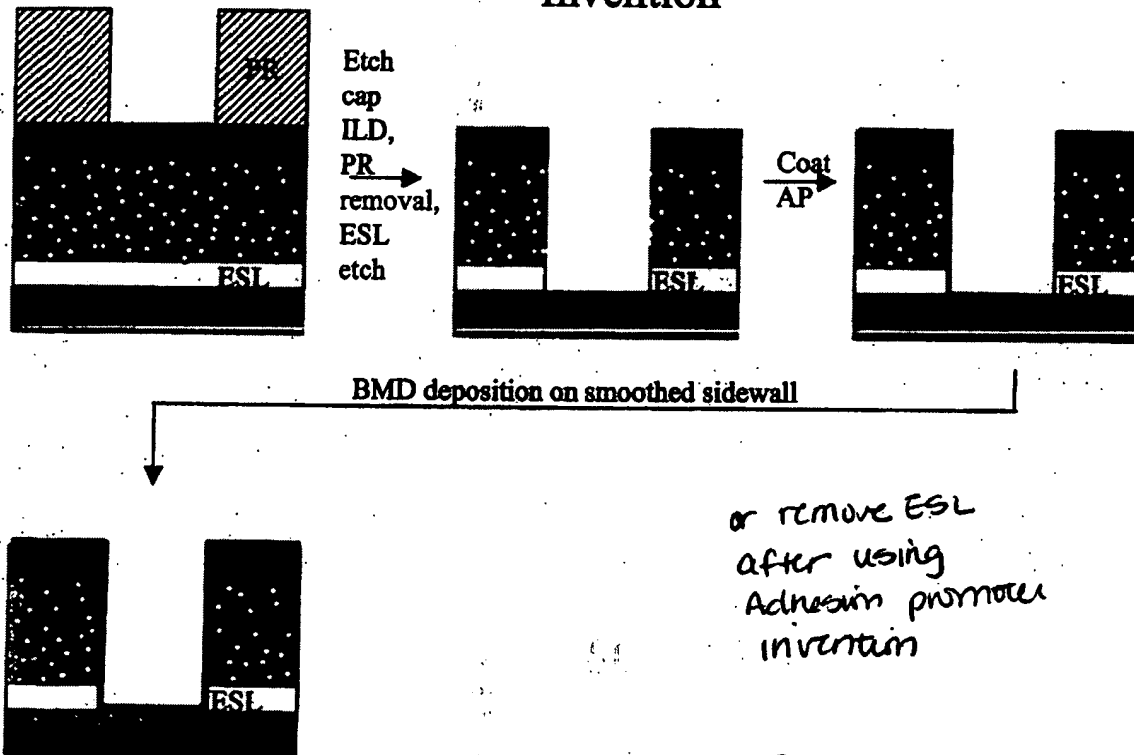
Employee #: 26375

Name(s) of attorney(s) preferred by inventor(s) to prepare patent application, if known: John Hankins at McDermott, Will and Emery \_\_\_\_\_

## Background



## Adhesion Promoter Invention



AMD Confidential  
L. Okada

Witness 1 BW

Witness 2 2+

**AMD INVENTION DISCLOSURE**

TLD ID# B-1096

Rec'd date: \_\_\_\_\_

California & Asia: x42110, return to MS68;

Texas: x55964 return to MS562;

Dresden & Europe: x83401 Silke Kretzschmar at MS E21-PP.

This invention applies to: Project: ☐, Product: ☐, Process: ☒, Technology ☒, Other ☐  
**IMPORTANT** Please identify any potential use: improved sidewall profile for better BMD coverage \_\_\_\_\_

List 2 to 5 key search words related to the invention: sidewall sealing using mixed materials (hybrid)

Working title of invention: Using Mixed Materials for Sidewall Sealing

Inventor's signature: Lynne A. Okada date: \_\_\_\_\_  
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Co-Inventor's signature: Fei Wang date: \_\_\_\_\_  
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Co-Inventor's signature: Minh Tran date: \_\_\_\_\_  
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Co-Inventor's signature: Li You date: \_\_\_\_\_  
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Post Office address: \_\_\_\_\_

State total number of inventors here: 4. If there are more than four inventors, insert duplicate page 1.

Witness 1 initial: BW

Witness 2 initial: JH

## AMD INVENTION DISCLOSURE

**TLD ID#**

**Rec'd date**

**California & Asia: x42110, return to MS68:**

**Texas: x55964 return to MS562:**

Dresden & Europe: x83401 Silke Kretzschmar at MS E21-PP

**Identify known relevant art (patents, publications, other information):**

**State the problem solved by the invention:**

## Smoothing out the sidewall pores in porous ILD materials to improve BMD coverage

**Brief description and sketch of the invention (please attach copies of documents like AMD patent notebook pages, reports and drawings that are helpful in describing / understanding the invention):**\_\_\_\_\_

Use of a different low k material to seal sidewall pores and improve BMD coverage on the sidewalls. The materials for this invention include any hybrid porous/nonporous combinations and hybrid porous/porous combinations. For example, coating a JSR stack with porous or nonporous Black Diamond film. Other films currently available include Coral and SiLK. Both porous and nonporous coatings would cover the sidewall porosity and allow for better (continuous) BMD surface coverage.

**See drawing attachments.**

Patent notebook # \_\_\_\_\_ Page numbers \_\_\_\_\_ Number of drawings \_\_\_\_\_

**Witness 1 initial:**

**Witness 2 initial:**

sidewall sealing - hybrid combination      Revised on 10/29/01.

**AMD**  **CONFIDENTIAL**

**Attorney-Client Privileged Information**

Page 2

**AMD INVENTION DISCLOSURE**

TLD ID# \_\_\_\_\_

Rec'd date \_\_\_\_\_

California &amp; Asia: x42110, return to MS68;

Texas: x55964 return to MS62;

Dresden &amp; Europe: x83401 Silke Kretzschmar at MS E21-PP.

Advantages (check all that apply):

<input type="checkbox"/> simplifies manufacturing	<input checked="" type="checkbox"/> improves accuracy / precision	<input type="checkbox"/> reduces component parts
<input type="checkbox"/> reduces cost of manufacturing	<input checked="" type="checkbox"/> improves reliability	<input type="checkbox"/> improves signal to noise ratio
<input checked="" type="checkbox"/> improves density	<input type="checkbox"/> improves efficiency	<input type="checkbox"/> provides new functionality
<input checked="" type="checkbox"/> increases operating speed	<input type="checkbox"/> increases operating range	<input type="checkbox"/> other, explain below

Discussion of advantage(s) of the invention over other solutions

(emphasize technical advance in the art as measured against known art): \_\_\_\_\_

Current techniques for sidewall sealing utilize inorganic material such as SiN, SiC, or SiCN. These materials have relatively high dielectric constants (~7, ~4, and ~3.5). Utilizing a hybrid approach allows use of a low k material to seal the sidewall porosity, leading to less influence on line capacitance. \_\_\_\_\_

**Please take special care to preserve documentary evidence of the original date of conception of the invention.**

AMD Inventors' notebooks with witness signatures are useful in this regard. Notebooks are issued on request to inventors by the local AMD site Technical Librarian.

Please attach copy of first written description(s) of invention, with dates, names of persons with whom the description was discussed.

Please attach copy of first drawing(s) of invention, with date(s).

Describe any external disclosure of invention, place, date, circumstances of disclosure, with copy of NDA.

Does plan exist to publish, disclose or sell? No ☐, Yes ☐, If yes, where and when? \_\_\_\_\_Was invention jointly developed with participation of inventors from outside AMD: No ☐, Yes ☐.

If yes, Company name \_\_\_\_\_

If yes, name of AMD business contact and development contract no. \_\_\_\_\_

**I have read and understood this disclosure and read and signed each page of the attachments:**

Witness 1

signature: \_\_\_\_\_

Date: \_\_\_\_\_

Printed name: \_\_\_\_\_

Betty Wilkins

Employee #: 24865

Witness 2

signature: \_\_\_\_\_

Date: \_\_\_\_\_

Printed name: \_\_\_\_\_

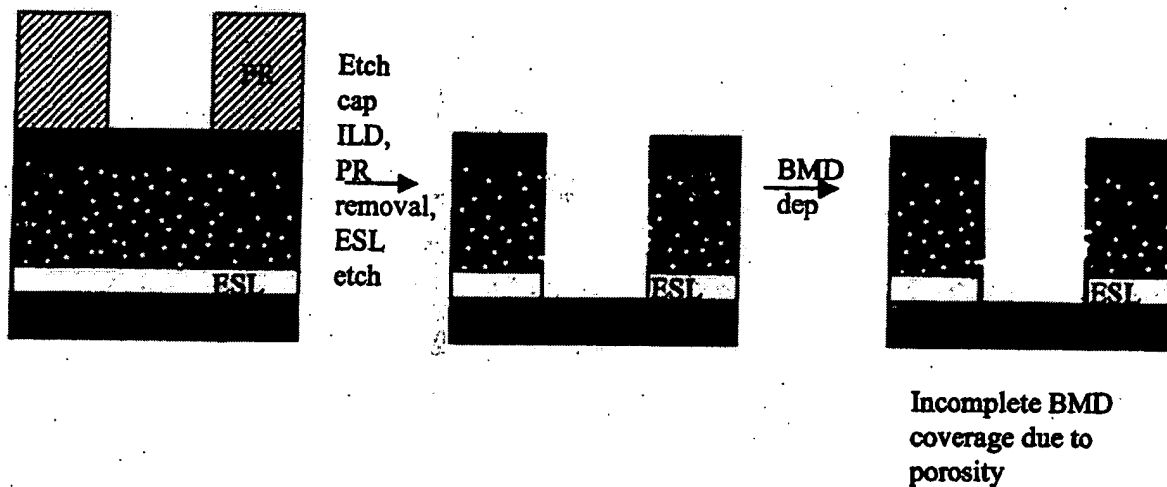
James XIE

Employee #: 26375

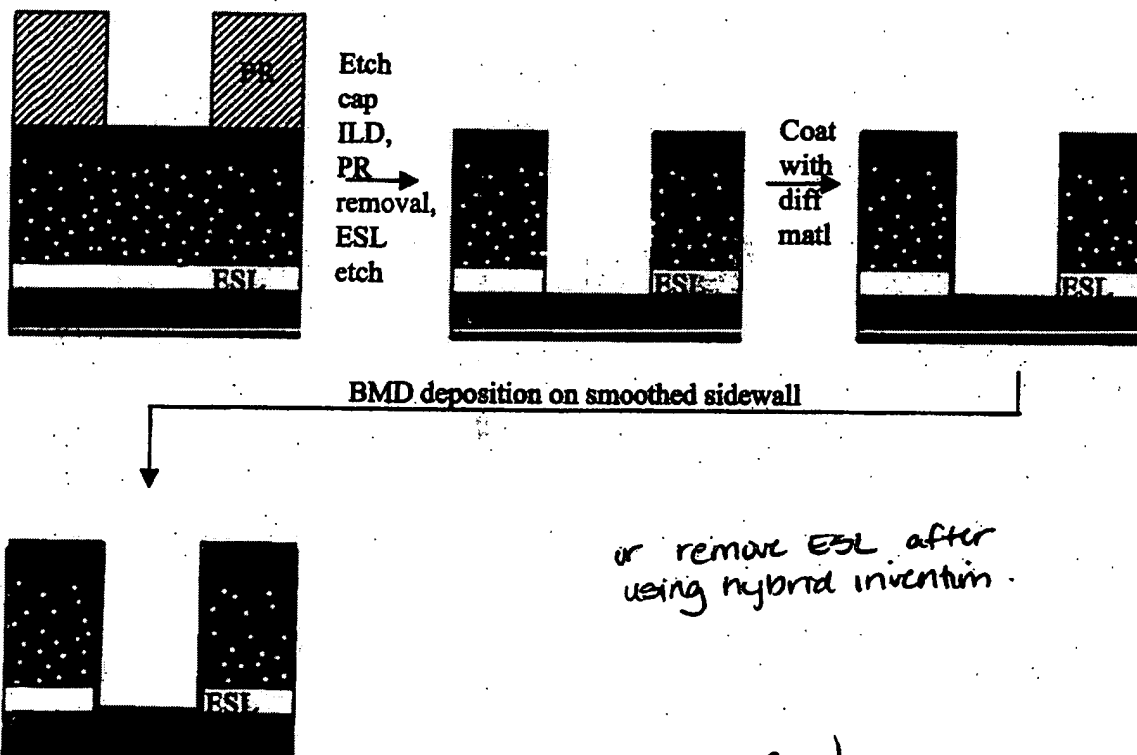
Name(s) of attorney(s) preferred by inventor(s) to prepare patent application, if known: John Hankins at McDermott, Will and Emery \_\_\_\_\_



## Background



## Hybrid Invention



AMD Confidential  
L. Okada

Witness 1

BW

Witness 2

Jk

**AMD INVENTION DISCLOSURE**

TLD ID#

H1097

Rec'd date

California & Asia: x42110, return to MS68;

Texas: x55964 return to MS562;

Dresden & Europe: x83401 Silke Kretzschmar at MS E21-PP.

This invention applies to: Project: ☐, Product: ☐, Process: ☒, Technology ☒, Other ☐.  
**IMPORTANT** Please identify any potential use: improved sidewall profile for better BMD coverage

List 2 to 5 key search words related to the invention: self sealing sidewall

Working title of invention: Using "like" materials for sidewall sealing of porous ILDs

Inventor's signature: Lynne A. Okada date: \_\_\_\_\_  
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Residence address: 1031 Grape Ave, Sunnyvale, CA 94087  
Post Office address: \_\_\_\_\_

Co-Inventor's signature: Fei Wang date: \_\_\_\_\_  
Co-Inventor's printed full name: Fei Wang Citizenship: USA  
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Residence address: 6005 Wellfleet Way, San Jose, CA 95129  
Post Office address: \_\_\_\_\_

Co-Inventor's signature: Minh Tran date: \_\_\_\_\_  
Co-Inventor's printed full name: Minh Quoc Tran Citizenship: USA  
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State total number of inventors here: 4. If there are more than four inventors, insert duplicate page 1.

Witness 1 initial: BW

Witness 2 initial: JX

## AMD INVENTION DISCLOSURE

**TLD ID#:**

**Rec'd date:**

**California & Asia: x42110, return to MS68;**

**Texas: x55964 return to MS562;**

**Dresden & Europe: x83401 Silke Kretzschmar at MS E21-pp.**

**Identify known relevant art (patents, publications, other information):**

**State the problem solved by the invention:**

## Smoothing out the sidewall pores in porous ILD materials to improve BMD coverage

**Brief description and sketch of the invention (please attach copies of documents like AMD patent notebook pages, reports and drawings that are helpful in describing / understanding the invention):**\_\_\_\_\_

Use of a similar material to seal sidewall pores and improve BMD coverage on the sidewalls. The materials for this invention include any porous/nonporous combinations and porous/porous combinations. For example, coating a porous SiLK patterned stack with either porous SiLK (noncured) or SiLK. Other film examples are films by Black Diamond (from AMAT), Coral (from Novellus), and JSR. Both porous and nonporous coatings would cover the sidewall porosity and allow for better (continuous) BMD surface coverage.

**See drawing attachments.**

Patent notebook # \_\_\_\_\_ Page numbers \_\_\_\_\_ Number of drawings \_\_\_\_\_

**Witness 1 initial:**

**Witness 2 initial:**

Sidewall sealing - like materials Revised on 10/29/01

**AMD**  **CONFIDENTIAL** Attorney-Client Privileged Information

Page 2.

**AMD INVENTION DISCLOSURE**

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Rec'd date \_\_\_\_\_

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Dresden &amp; Europe: x83401 Silke Kretzschmar at MS E21-PP.

Advantages (check all that apply):

<input type="checkbox"/> simplifies manufacturing	<input checked="" type="checkbox"/> improves accuracy / precision	<input type="checkbox"/> reduces component parts
<input type="checkbox"/> reduces cost of manufacturing	<input checked="" type="checkbox"/> improves reliability	<input type="checkbox"/> improves signal to noise ratio
<input checked="" type="checkbox"/> improves density	<input type="checkbox"/> improves efficiency	<input type="checkbox"/> provides new functionality
<input checked="" type="checkbox"/> increases operating speed	<input type="checkbox"/> increases operating range	<input type="checkbox"/> other, explain below

Discussion of advantage(s) of the invention over other solutions

(emphasize technical advance in the art as measured against known art): \_\_\_\_\_

Current techniques for sidewall sealing utilize inorganic material such as SiN, SiC, or SiCN. These materials have relatively high dielectric constants (~7, ~4, and ~3.5). Utilizing low k materials to seal sidewall pores would provide the benefit of sidewall sealing but not compromising the interlayer dielectric as much, minimizing the influence on the line capacitance. \_\_\_\_\_

Please take special care to preserve documentary evidence of the original date of conception of the invention. AMD Inventors' notebooks with witness signatures are useful in this regard. Notebooks are issued on request to inventors by the local AMD site Technical Librarian.

Please attach copy of first written description(s) of invention, with dates, names of persons with whom the description was discussed.

Please attach copy of first drawing(s) of invention, with date(s).

Describe any external disclosure of invention, place, date, circumstances of disclosure, with copy of NDA. \_\_\_\_\_

Does plan exist to publish, disclose or sell? No ☐, Yes ☐, If yes, where and when? \_\_\_\_\_

Was invention jointly developed with participation of inventors from outside AMD: No ☐, Yes ☐.

If yes, Company name \_\_\_\_\_

If yes, name of AMD business contact and development contract no. \_\_\_\_\_

I have read and understood this disclosure and read and signed each page of the attachments:

Witness 1

signature: \_\_\_\_\_

Date: \_\_\_\_\_

Printed name: \_\_\_\_\_

Betty Wilens

Employee #: 29865

Witness 2

signature: \_\_\_\_\_

Date: \_\_\_\_\_

Printed name: \_\_\_\_\_

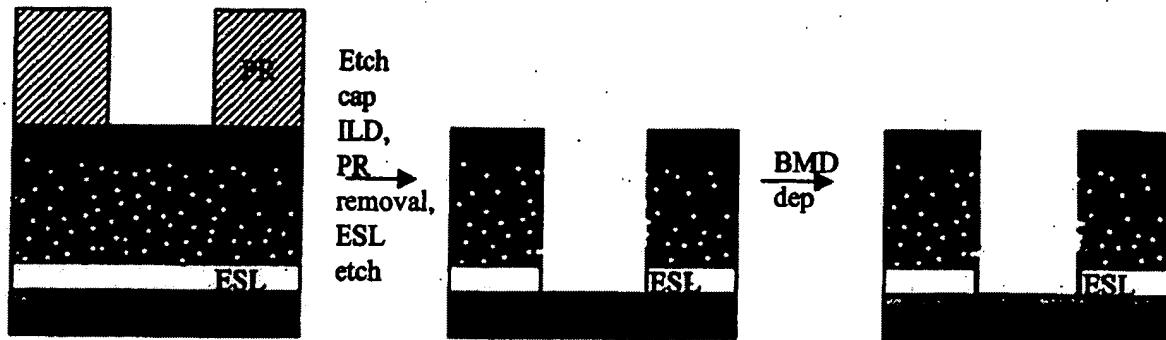
James Xie

James Xie

Employee #: 26375

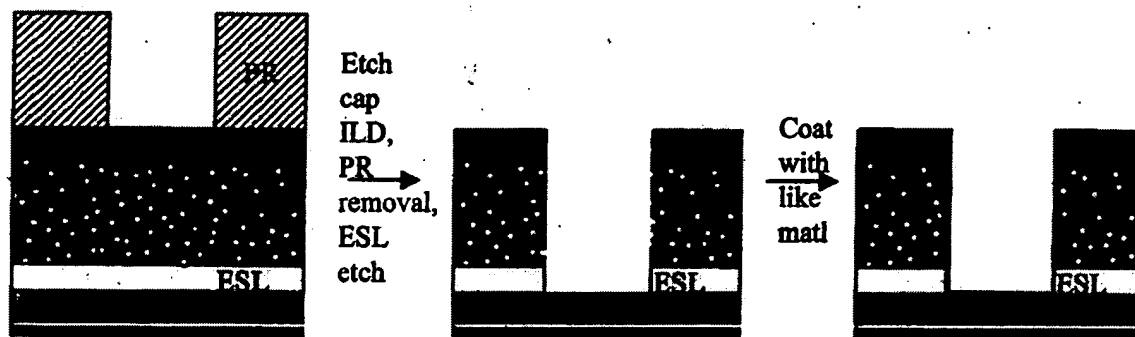
Name(s) of attorney(s) preferred by inventor(s) to prepare patent application, if known: John Hankins at McDermott, Will and Emery \_\_\_\_\_

## Background

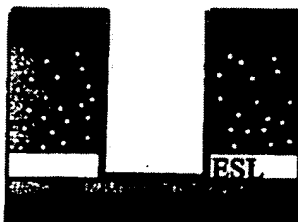


Incomplete BMD coverage due to porosity

## Self-Sealing Invention



BMD deposition on smoothed sidewall



or remove ESL after using self-sealing invention

Witness 1 BW

Witness 2 JX

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L. Okada

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